

Taming Natural Disasters

**DRAFT Multi-Jurisdictional
Local Government
Hazard Mitigation Plan
for the San Francisco
Bay Area**

DRAFT - October 2004

ASSOCIATION OF BAY AREA GOVERNMENTS

BACKGROUND

The purpose of this DRAFT document is to serve as a catalyst for a dialog on public policies needed to mitigate the natural hazards that affect the San Francisco Bay Area.

The overall strategy is to use this multi-jurisdictional effort to not only maintain and enhance the disaster resistance of our region, but also to fulfill the requirements of the Disaster Mitigation Act of 2000 for all local governments to develop and adopt this type of plan.

For purposes of this plan, local governments include not only the cities and counties of our region, but also special districts with elected boards.

For information complete information on ABAG's Local Hazard Mitigation Planning Effort, including interactive hazard mapping and risk assessment, see our Internet site at: *<http://quake.abag.ca.gov/mitigation>*

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Credits

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DRAFT Principles

Our Challenge

The San Francisco Bay Area is in a spectacular region with valleys and ridges, views and access to rivers, the ocean, and the Bay, and a mild climate. It is also home to 7 million people and has a \$400 billion economy¹.

But many of those ridges and valleys have been formed by active earthquake faults that can generate devastating shaking and ground failures. The typically mild climate is subject to occasional winter storms leading to landslides in the hills and flooding of the valleys. During the fire season, typically from May through November, the region is subject to periods of Diablo Winds bringing high temperatures, gusting winds, and low humidity. Tinder-dry trees, brush, and grasslands are subject to fires that can become catastrophic on the edges of urban development. Given an increasingly mobile population, our citizens and crops are subject to disease epidemics. Natural disasters can lead to secondary events that are disasters in themselves, including hazmat releases and dam failures. During the period from 1950 – 2000, all or part of the Bay Area was subjected to 56 disasters, or about a third of the 181 occurring in the entire State of California during that time².

These hazards are not new, and neither are the risks to lives, property, the environment, and our economy. Bay Area local governments, together with private utilities and the state, have created programs and regulations that are as creative and comprehensive as any region in the world.

Yet we need to continue to work to reduce risks from natural hazards to protect lives, property, the environment, and our economy.

This natural hazard mitigation plan is a joint effort by the cities, counties, and special districts in the Bay Area to build a more disaster-resistant region. We recognize that disasters do not respect the boundaries between our individual jurisdictions.

Goal

To maintain and enhance a disaster-resistant region by reducing the potential loss of life, property damage, and environmental degradation from natural disasters, while accelerating economic recovery from those disasters.

¹ Fassinger and others, 2003 – *ABAG's Projections 2003*. Economy is based on annual Gross Regional Product (GRP).

² California Governor's Office of Emergency Services database of disasters and major states of emergencies.

Commitments

1. Infrastructure

Our transportation and utility facilities and networks are vital lifelines during and following disasters, as well as in the functioning of our region and its economy.

2. Health

The facilities, networks, and systems providing care of our sick and those with special needs need to be resilient after disasters for these systems will need to care for additional injured at the same time as those currently cared for are stressed.

3. Housing

Bay Area residents need to have safe and disaster-resistant housing that is architecturally diverse and serves a variety of household sizes and incomes.

4. Economy

Safe, disaster-resilient, and architecturally diverse downtown commercial areas, business and industrial complexes, and office buildings are essential to the overall economy of the region.

5. Government Services

City and county governments, as well as community services agencies, provide essential services during and immediately following disasters, as well as critical functions during recovery, that need to be resistant to disasters.

6. Education

Safe and disaster-resistant school and childcare-related facilities are critical to the safety of our children, as well as to the quality of life of our families.

7. Environment

Disaster resistance needs to further environmental sustainability, reduce pollution, strengthen agriculture resiliency, and avoid hazardous material releases.

8. Land Use

Land use change needs to be accompanied by a respect for hazardous areas and facilities, as well as recognize the interconnected nature of our region.

DRAFT Ideas for Implementation

Background on Implementation Strategy Organization

The strategies are listed under the eight major commitments identified on the previous page, rather than by hazard. With this organization, all of the Bay Area's cities, counties, and special districts should find ways to address all eight of these major commitments.

Any scheme to identify a comprehensive list of potential strategies is bound to have some overlaps. This list is no exception. Because those ideas listed under housing and economy have at their core the relationship between government and the people who live and work in their jurisdictions, there is overlap. City and counties, as well as special districts handling lifelines and schools, have buildings that are critical to their functioning, so there is duplication in the discussion of these issues.

*Most of the strategies listed are clearly within the definition of "hazard mitigation," that is, "any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards."*³ In addition, there are three notable areas where we have "pushed" this definition.

- ◆ The first is in the area of public education. Author Stephen Flynn notes in his 2004 book⁴ in a plea for greater public education following 9/11 that federal "security officials often act as though members of the American public are either potential recruits for an easily panicked mob or a passive part of a haystack that must constantly be sifted through to find terrorist needles." The Bay Area learned this lesson twelve years earlier in 1989 as a result of the Loma Prieta earthquake. People who live and work in our region also need to understand our hazards so that they can take appropriate mitigation measures in their homes, schools, and work places.
- ◆ Second, we have included under **Government Services** several ideas to "*Maintain and Enhance Local Government's Emergency Response and Recovery Capacity.*" These ideas have been included because we believe that many go well beyond the traditional response activities of city and county police and fire services.
- ◆ Finally, several strategies are drafted so that they apply to natural – and security – hazards, such as the mitigation of disasters resulting from weapons of mass destruction. Local government actions to deal with managing "natural" deadly pathogens such as SARS, AIDS, West Nile, and mad cow disease in an increasingly mobile world can also assist in the response to bioterrorism. Hazmat releases and dam failures due to flooding, earthquakes, or terrorism have some similar impacts and therefore some similar mitigation strategies. Some methods of combating "common" crime and violence may deter major terrorist actions.

³ Stafford Act (44 CFR 206:401)

⁴ Flynn, Stephen. 2004. *America the Vulnerable: How Our Government Is Failing to Protect Us from Terrorism*. HarperCollins Publishers, New York, page 160.

Status and Priorities

For each of the following potential mitigation strategies, local governments will be asked to indicate one of the following ***AFTER the list of strategies is finalized.***

- ☐ Existing program
Responsible agency or department _____
Provide ordinance or resolution number, if applicable _____
- ☐ Very High priority – to be adopted by local government immediately
Responsible agency or department _____
- ☐ High priority – to be adopted by local government as soon as funding and resources allow
Agency responsible for seeking and administering funding _____
- ☐ Moderate priority – will be adopted by local government as funding and resources allow
- ☐ Under study
Responsible agency or department _____
Provide estimated date of completion _____
- ☐ Not applicable, not appropriate, or not cost effective
- ☐ Not yet considered

This list is a “work in progress.” It will expand and change over time, hopefully becoming as dynamic as the restless earth whose hazards demand our attention. It is not meant to discourage local experimentation with alternative strategies. Rather, it is meant to be a list of both common and innovative practices. In addition, local governments choosing to reword specific strategies to meet their local needs, or to be more specific in their strategies, can do so.

Some of the strategies will not be appropriate for some jurisdictions, but all jurisdictions should be able to address the general commitments with identifiable actions. Valid risk management requires a careful weighing of the costs and benefits of action. Over time, we are committed to developing better hazard and risk information to use in making those trade-offs. We are not trying to create a disaster-proof region, but a disaster-resistant one. Finally, the cost of strategies varies greatly. Some of the most cost-effective relate to building and maintaining partnerships, not buildings.

1. Infrastructure (INFR)

Our transportation and utility facilities and networks are vital lifelines during and following disasters, as well as in the functioning of our region and its economy.

INFR-a. Multi-hazard

- 1) Assess the vulnerability of critical facilities designated by lifeline operators⁵ to damage in natural disasters or security threats, including facilities owned outside of the Bay Area that can impact service delivery within the region.
- 2) Comply with State of California and federal requirements to assess the vulnerability of dams to damage from earthquakes, seiches, landslides, liquefaction, or security threats.

⁵ Lifeline agencies, departments, and districts are those that operate transportation and utility facilities and networks.

- 3) Encourage the cooperation of utility system providers and cities, counties, and other special districts to develop strong and effective mitigation strategies.
- 4) Retrofit or replace critical lifeline facilities and/or their backup facilities that are shown to be vulnerable to damage in natural disasters.
- 5) Support and encourage efforts of *other* (lifeline) agencies as they plan for and arrange financing for seismic retrofits and other disaster mitigation strategies. (For example, a city might pass a resolution in support of a transit agency's retrofit program.)
- 6) Plan for speeding the repair and functional restoration of lifeline systems through stockpiling of shoring materials, temporary pumps, surface pipelines, portable hydrants, and other supplies, such as those available through the Water Agency Response Network (WARN).
- 7) Support research by others on measures to further strengthen transportation, water, sewer, and power systems so that they are less vulnerable to damage in disasters.
- 8) Pre-position emergency power generation capacity (or have rental/lease agreements for these generators) in critical buildings of cities, counties, and special districts to maintain continuity of government and services.
- 9) Have back-up emergency power available for critical intersection traffic lights.
- 10) Develop unused or new pedestrian rights-of-way as walkways to serve as additional evacuation routes.
- 11) Coordinate with PG&E and others to investigate ways of minimizing the likelihood that power interruptions will adversely impact vulnerable communities, such as the disabled and the elderly.
- 12) Encourage replacing aboveground electric and phone wires and other structures with underground facilities, and use the planning-approval process to ensure that all new phone and electrical utility lines are installed underground.
- 13) Coordinate with the State Division of Safety of Dams to ensure an adequate timeline for the maintenance and inspection of dams, as required of dam owners by State law.
- 14) Encourage communication between State OES, FEMA, and utilities related to emergencies occurring outside of the Bay Area that can affect service delivery in the region.

INFR-b. *Earthquakes*

- 1) Expedite the funding and retrofit of seismically-deficient city- and county-owned bridges and road structures by working with Caltrans and other appropriate governmental agencies.
- 2) Establish a higher priority for funding seismic retrofit of existing transportation and infrastructure systems (such as BART) than for expansion of those systems.
- 3) Include "areas subject to high ground shaking, earthquake-induced ground failure, and surface fault rupture" in the list of criteria used for determining a replacement schedule for pipelines (along with importance, age, type of construction material, size, condition, and maintenance or repair history).
- 4) Install specially-engineered pipelines in areas subject to faulting, liquefaction, earthquake-induced landsliding, or other earthquake hazard.

- 5) Replace or retrofit water-retention structures that are determined to be structurally deficient.
- 6) Install portable facilities (such as hoses, pumps, emergency generators, or other equipment) to allow pipelines to bypass failure zones such as fault rupture areas, areas of liquefaction, and other ground failure areas (using a priority scheme if funds are not available for installation at all needed locations).
- 7) Install earthquake-resistant connections when pipes enter and exit bridges.

INFR-c. *Wildfire*

- 1) Ensure a reliable source of water for fire suppression (meeting acceptable standards for minimum volume and duration of flow) for new and existing development.
- 2) Develop a coordinated approach between fire jurisdictions and water supply agencies to identify needed improvements to the water distribution system, initially focusing on areas of highest wildfire hazard.
- 3) Develop a defensible space vegetation program that includes the clearing or thinning of (a) non-fire resistive vegetation within 30 feet of access and evacuation roads and routes to critical facilities, or (b) all non-native species (such as eucalyptus and pine, but not necessarily oaks) within 30 feet of access and evacuation roads and routes to critical facilities.
- 4) Ensure all dead-end segments of public roads in high hazard areas have at least a “T” intersection turn-around sufficient for typical wildland fire equipment.
- 5) Enforce minimum road width of 20 feet with an additional 10-foot clearance on each shoulder on *all* driveways and road segments greater than 50 feet in length in wildfire hazard areas.
- 6) Require that development in high fire hazard areas provide adequate access roads (with width and vertical clearance that meet the minimum standards of the *Fire Code* or relevant local ordinance), onsite fire protection systems, evacuation signage, and fire breaks.
- 7) Ensure adequate fire equipment access to developed and open space areas.
- 8) Maintain fire roads and/or public right-of-way roads and keep them passable at all times.

INFR-d. *Flooding*

- 1) Conduct a watershed analysis of runoff and drainage systems to predict areas of insufficient capacity in the storm drain and natural creek system.
- 2) Develop procedures for performing a watershed analysis to look at the impact of development on flooding potential downstream.
- 3) Conduct a watershed analysis at least once every three years.
- 4) Assist the U.S. Army Corp of Engineers, various Flood Control and Water Conservation Districts, and other responsible agencies to locate and maintain funding for the development of flood control projects that have high cost-benefit ratios.
- 5) Pursue funding for the design and construction of storm drainage projects to protect vulnerable properties, including property acquisitions, upstream storage

such as detention basins, and channel widening with the associated right-of-way acquisitions, relocations, and environmental mitigations.

- 6) Continue to repair and make structural improvements to storm drains, pipelines, and/or channels to enable them to perform to their design capacity in handling water flows as part of regular maintenance activities.
- 7) Continue maintenance efforts to keep storm drains and creeks free of obstructions, while retaining vegetation in the channel (as appropriate), to allow for the free flow of water.
- 8) Enforce provisions under creek protection, stormwater management, and discharge control ordinances designed to keep watercourses free of obstructions and to protect drainage facilities.
- 9) Develop an approach and locations for various watercourse bank protection strategies, including rip rap, stream bed depth management using dredging, and removal of out-of-date coffer dams in rivers and tributary streams.
- 10) Use reservoir sediment removal as one way to increase storage for both flood control and water supply.
- 11) Elevate critical bridges affected by flooding to increase stream flow and maintain critical access and egress routes.
- 12) Provide a mechanism to expedite the repair or replacement of levees that are vulnerable to collapse from earthquake-induced shaking or liquefaction, rodents, and other concerns, particularly those protecting critical infrastructure.
- 13) Ensure that utility systems in new developments are constructed in ways that reduce or eliminate flood damage.
- 14) Determine whether or not wastewater treatment plants are protected from floods, and if not, investigate the use of flood-control berms to not only protect from stream or river flooding, but also increasing plant security.
- 15) Work cooperatively with water agencies, flood control districts, Caltrans, and local transportation agencies to determine appropriate performance criteria for watershed analysis.
- 16) Work for better cooperation among the patchwork of agencies managing flood control issues.

INFR-e. *Landslides*

- 1) Include “areas subject to ground failure” in the list of criteria used for determining a replacement schedule (along with importance, age, type of construction material, size, condition, and maintenance or repair history) for pipelines.
- 2) Establish requirements in zoning ordinances to address hillside development constraints in areas of steep slopes that are likely to lead to excessive road maintenance or where roads will be difficult to maintain during winter storms due to landsliding.

INFR-f. *Building Reoccupancy*

- 1) Ensure that critical buildings owned or leased by special districts or private utility companies participate in a program similar to San Francisco’s Building Occupancy Resumption Program (BORP). The BORP program permits owners

of buildings to hire qualified structural engineers⁶ to create facility-specific post-disaster inspection plans and allows these engineers to become automatically deputized as City/County inspectors for these buildings in the event of an earthquake or other disaster. This program allows rapid reoccupancy of the buildings.

INFR-g. *Public Education*

- 1) Provide materials to the public related to planning for power outages.
- 2) Provide materials to the public related to family and personal planning for delays due to traffic or road closures.
- 3) Provide materials to the public related to coping with reductions in water supply or contamination of that supply.
- 4) Provide materials to the public related to coping with disrupted storm drains, sewage lines, and wastewater treatment.
- 5) Facilitate and/or coordinate the distribution of materials that are prepared by others, such as by placing materials in city or utility newsletters, or on community access channels, as appropriate.

2. Health (HEAL)

The facilities, networks, and systems providing care of our sick and those with special needs need to be resilient after disasters for these systems will need to care for additional injured at the same time as those currently cared for are stressed.

HEAL-a. *Hospitals and Other Critical Health Care Facilities*

- 1) Work with critical health care facilities operators to ensure that critical facilities are structurally sound and have nonstructural systems designed to remain functional following disasters (as required for acute-care hospitals for earthquakes by State law).
- 2) Ensure health care facilities near wildfire hazard areas are adequately prepared to care for victims with respiratory problems related to smoke and particulate matter inhalation.
- 3) Work with health care facilities to institute isolation capacity should a need for them arise following a communicable disease epidemic.
- 4) Ensure that hospitals and other major health care facilities have auxiliary water and power sources.

HEAL-b. *Other Facilities*

- 1) Install appropriate detection equipment in government-managed hospital clinical laboratories (and institute appropriate employee training for use of that equipment) to ensure timely recognition of unusual biological agents.
- 2) Designate locations for the distribution of antibiotics to large numbers of people should the need arise.

⁶ A qualified structural engineer is a California licensed structural engineer with relevant experience.

HEAL-c. *Health Personnel*

- 1) Create discussion forums for food and health personnel, including, for example, medical professionals, veterinarians, and plant pathologists, to develop safety, security, and response strategies for food supply contamination.

3. Housing (HSNG)

Bay Area residents need to have safe and disaster-resistant housing that is architecturally diverse and serves a variety of household sizes and incomes.

HSNG-a. *Multi-Hazard*

- 1) Be aware of past problems of inadequate hazard disclosure and work with real estate agents to improve enforcement of real estate disclosure requirements for those hazards covered by this plan through, for example, making those agents and the disclosure firms aware of the hazard maps incorporated in this plan and available on the ABAG web site at <http://quake.abag.ca.gov/mitigation>, as well as locally developed maps.

HSNG-b. *Single-Family Homes Vulnerable to Earthquakes*

- 1) Utilize or recommend adoption of a retrofit standard that includes standard plan sets and construction details for voluntary bolting of homes to their foundations and bracing of outside walls of crawl spaces (“cripple” walls), such as that being developed by a committee representing the East Bay-Peninsula-Monterey Chapters of the International Code Council (ICC), California Building Officials (CALBO), the Structural Engineers Association of Northern California (SEAONC), the Northern California Chapter of the Earthquake Engineering Research Institute (EERI-NC), and ABAG’s Earthquake Program.
- 2) Require engineered plan sets for retrofitting of heavy two-story homes with living areas over garages, as well as for split level homes, until standard plan sets and construction details become available.
- 3) Require engineered plan sets for retrofitting of homes on steep hillsides.
- 4) Encourage local government building inspectors to take classes (such as the FEMA-developed training classes offered by ABAG) on retrofitting of single-family homes on a periodic basis.
- 5) Encourage private retrofit contractors and home inspectors doing work in your area to take retrofit classes (such as the FEMA-developed training classes offered by ABAG) on retrofitting of single-family homes on a periodic basis.
- 6) Conduct demonstration projects on common existing housing types demonstrating structural and nonstructural mitigation techniques as community models for earthquake mitigation.
- 7) Provide retrofit classes or workshops for homeowners.
- 8) Establish tool-lending libraries with common tools needed for retrofitting for use by homeowners with appropriate training.
- 9) Provide financial incentives to owners of these homes to retrofit.

HSNG-c. *Soft-Story⁷ Multifamily Residential Structures Vulnerable to Earthquakes*

- 1) Require engineered plan sets for voluntary or mandatory soft-story retrofits until a standard plan set and construction details become available.
- 2) Adopt the 2003 International Existing Building Code, the 1997 UBC, or the latest applicable code standard for the design of voluntary or mandatory soft-story building retrofits.
- 3) Work to educate condominium and apartment owners, local government staff, engineers, and contractors on soft-story retrofit using materials such as those developed by ABAG (see <http://quake.abag.ca.gov/fixit>) and the City of San Jose.
- 4) Conduct an inventory of existing or suspected soft-story residential structures.
- 5) Use the soft-story inventory to require owners to inform all existing tenants that they live in this type of building and the standard to which it may have been retrofitted, as well as require owners to inform tenants that they will live in this type of building prior to signing a lease.
- 6) Use the soft-story inventory to require owners to inform all existing tenants that they should be prepared to live elsewhere following an earthquake if the building has not been retrofitted.
- 7) Investigate and adopt appropriate financial, procedural, and land use incentives for owners of soft-story buildings to facilitate retrofit.
- 8) Explore development of local ordinances or State regulations to require or encourage owners of soft-story structures to strengthen them.
- 9) Provide technical assistance in seismically strengthening soft-story structures.

HSNG-d. *Unreinforced Masonry Housing Stock*

- 1) Continue to actively implement existing State law that requires cities and counties to maintain lists of the addresses of unreinforced masonry buildings and inform property owners that they own this type of hazardous structure.
- 2) Accelerate retrofitting of unreinforced masonry structures that have not been retrofitted through, for example, (a) actively working with owners to obtain structural analyses of their buildings, (b) helping owners obtain retrofit funding, (c) adopting a mandatory versus voluntary, retrofit program, and/or (d) applying penalties to owners who show inadequate efforts to upgrade these buildings.
- 3) Require owners to inform all existing tenants that they live in this type of building and the standard to which it may have been retrofitted, as well as require owners to inform tenants that they will live in this type of building prior to signing a lease.
- 4) Require owners to inform all existing tenants that they should be prepared to live elsewhere following an earthquake even if the building has been retrofitted, for it has probably been retrofitted to a life-safety standard, not to a standard that will allow occupancy following major earthquakes.

⁷ A condition in which the building has far less stiffness in its lowest story than in upper stories, often due to multiple garage openings at the ground floor or large open windows for commercial space, increasing the likelihood of excessive sidesway or even collapse. Many of these buildings collapsed in the 1971 San Fernando, 1989 Loma Prieta, and 1994 Northridge earthquakes. An engineering definition is "a condition in which the stiffness of the seismic-force-resisting system in any story is less than 70 percent of the stiffness in the story above" (modified from the American Society of Civil Engineers (ASCE 31).

- 5) Create incentives for owners of historic or architecturally significant buildings to undertake mitigation to levels that will minimize the likelihood that these buildings will need to be demolished after a disaster, particularly if those alterations conform to the federal Secretary of the Interior's *Guidelines for Rehabilitation*.

HSNG-e. *Mobile Homes and Earthquakes*

- 1) Identify and work toward tying down mobile homes used as year-round permanent residences using an appropriate cost-sharing basis (for example, 75% grant, 25% owner).

HSNG-f. *New Construction and Earthquakes*

- 1) Continue to require that all new housing be constructed in compliance with structural requirements of the most recently adopted version of the *California Building Code*.
- 2) Conduct appropriate employee training and support continued education to ensure enforcement of building codes and construction standards, as well as identification of typical design inadequacies of housing and recommended improvements.

HSNG-g. *Wildfire and Structural Fires*

- 1) Increase efforts to reduce hazards in existing development in high wildfire hazard areas (identified as wildland-urban-interface fire-threatened communities or in areas exposed to high-to-extreme fire threat) through improving engineering design and vegetation management for mitigation, appropriate code enforcement, and public education on defensible space mitigation strategies.
- 2) Tie public education on defensible space and a comprehensive defensible space ordinance to a field program of enforcement.
- 3) Require that new homes in wildland-urban-interface fire-threatened communities or in areas exposed to high-to-extreme fire threat be constructed of fire-resistant building materials (including roofing and exterior walls) and incorporate fire-resistant design features (such as minimal use of eaves, internal corners, and open first floors) to increase structural survivability and reduce ignitability⁸.
- 4) Develop financial incentives for homeowners to be "model" defensible space homes in neighborhoods that are wildland-urban- interface fire-threatened communities or in areas exposed to high-to-extreme fire threat.
- 5) Consider fire safety, evacuation, and emergency vehicle access when reviewing proposals to add secondary units or additional residential units in wildland-urban-interface fire-threatened communities or in areas exposed to high-to-extreme fire threat.
- 6) Adopt and/or amend, as needed, updated versions of the *California Building and Fire Codes* so that optimal fire-protection standards are used in construction and renovation projects.
- 7) Create a mechanism to enforce provisions of the *California Building and Fire Codes* and local housing codes that require the installation of smoke detectors

⁸ See *Structural Fire Prevention Field Guide for Mitigation of Wildfires* at <http://osfm.fire.ca.gov/structural.html>.

and/or fire-extinguishing systems by making installation a condition of (a) finalizing a permit for any work on existing properties valued at over \$1000, and/or (b) a condition for the transfer of property if these changes are determined cost-effective strategies.

- 8) Work to ensure a reliable source of water for fire suppression in rural-residential areas through the cooperative efforts of water districts, fire districts, and residents.
- 9) Expand vegetation management programs in wildland-urban- interface fire-threatened communities or in areas exposed to high-to-extreme fire threat to more effectively manage the fuel load through roadside collection and chipping, mechanical fuel reduction equipment, selected harvesting, use of goats or other organic methods of fuel reduction, and selected use of controlled burning.
- 10) Promote the installation of early warning fire alarm systems in homes wildland-urban-interface fire-threatened communities or in areas exposed to high-to-extreme fire threat connected to fire department communication systems.
- 11) Establish a Fire Hazard Abatement District to fund reduction in fire risk of existing properties through vegetation management that includes reduction of fuel loads, use of defensible space, and fuel breaks.
- 12) Work with residents in rural-residential areas to ensure adequate access and evacuation in wildland-urban- interface fire-threatened communities or in areas exposed to high-to-extreme fire threat.
- 13) Require fire sprinklers in new homes located more than 1.5 miles or a 5-minute response time from a fire station or in an identified high hazard wildland-urban-interface wildfire area.
- 14) Require fire sprinklers in all new or substantially remodeled multifamily housing, regardless of distance from a fire station
- 15) Require sprinklers in all mixed use development to protect residential uses from fires started in non-residential uses.
- 16) Compile a list of high-rise and high-occupancy buildings which are deemed, due to their age or construction materials, to be particularly susceptible to fire hazards, and determine an expeditious timeline for the fire-safety inspection of all such structures.
- 17) Conduct periodic fire-safety inspections of all multi-family buildings, as required by State law.
- 18) Ensure that fire-preventive vegetation-management techniques and practices for creek sides and high-slope areas do not contribute to the landslide and erosion hazard.
- 19) Create a mechanism to require the bracing of water heaters and flexible couplings on gas appliances, and/or (as specified under “a. Single-family homes vulnerable to earthquakes” above) the bolting of homes to their foundations and strengthening of cripple walls to reduce fire ignitions due to earthquakes.
- 20) Work with the State Fire Marshall, the California Seismic Safety, PEER, and other experts to identify and manage gas-related fire risks of soft-story residential or mixed use buildings that are prone to collapse and occupant entrapment

consistent with the natural gas safety recommendations of Seismic Safety Commission Report SSC-02-03.⁹

HSNG-h. *Flooding*

- 1) To reduce flood risk, and thereby reduce the cost of flood insurance to property owners, work to qualify for the highest-feasible rating under the Community Rating System of the National Flood Insurance Program.
- 2) Balance the housing needs of residents against the risk from potential flood-related hazards.
- 3) Ensure that new development pays its fair share of improvements to the storm drainage system necessary to accommodate increased flows from the development.
- 4) Provide sandbags and plastic sheeting to residents in anticipation of rainstorms, and deliver those materials to the disabled and elderly upon request.
- 5) Provide public information on locations for obtaining sandbags and deliver those sandbags to those various locations throughout a city and/or county.
- 6) Apply floodplain management regulations for development in the floodplain and floodway.
- 7) Ensure that new subdivisions are designed to reduce or eliminate flood damage by requiring lots and rights-of-way are laid out for the provision of approved sewer and drainage facilities, providing on-site detention facilities whenever practicable.
- 8) Encourage home and apartment owners to participate in home elevation programs.
- 9) As funding opportunities become available, encourage home and apartment owners to participate in acquisition and relocation programs for areas within floodways.
- 10) Encourage owners of properties in a floodplain to consider purchasing flood insurance. For example, point out that most homeowners' insurance policies do not cover a property for flood damage.

HSNG-i. *Landslides and Erosion*

- 1) Increase efforts to reduce landslides and erosion in existing and future development by improving appropriate code enforcement and use of applicable standards, such as those appearing in the *California Building Code*, California Geological Survey *Special Report 117 – Guidelines for Evaluating and Mitigating Seismic Hazards in California*¹⁰, American Society of Civil Engineers (ASCE) report *Recommended Procedures for Implementation of DMG Special Publication 117: Guidelines for Analyzing and Mitigating Landslide Hazards in California*¹¹, and the California Board for Geologists and Geophysicists *Guidelines for Engineering Geologic Reports*¹². Such standards should cover excavation, fill placement, cut-fill transitions, slope stability, drainage and erosion control, slope

⁹ See http://www.seismic.ca.gov/pub/CSSC_2002-03_Natural%20Gas%20Safety.pdf. Note: any valves that are installed may need to have both excess flow and seismic triggers ("hybrid" valves).

¹⁰ See <http://gmw.consrv.ca.gov/shmp/SHMPsp117.asp>.

¹¹ See <http://www.scec.org/resources/catalog/LandslideProceduresJune02.pdf>.

¹² See <http://www.geology.ca.gov/publications/engineering.pdf>.

setbacks, expansive soils, collapsible soils, environmental issues, geological and geotechnical investigations, grading plans and specifications, protection of adjacent properties, and review and permit issuance.

- 2) Increase efforts to reduce landslides and erosion in existing and future development through continuing education of design professionals on mitigation strategies.

HSNG-j. *Building Reoccupancy*

- 1) Develop and enforce an ordinance for disaster-damaged structures to ensure that residential buildings are repaired in an appropriate and timely manner.

HSNG-k. *Public Education*

- 1) Provide information to residents of your community on the availability of interactive hazard maps showing your community on ABAG's web site.
- 2) Develop printed materials, utilize existing materials (such as developed by FEMA and the American Red Cross), conduct workshops, and/or provide outreach encouraging residents to have family disaster plans that include drop-cover-hold earthquake drills, fire and storm evacuation procedures, and shelter-in-place emergency guidelines.
- 3) Better inform residents of comprehensive mitigation activities, including elevation of appliances above expected flood levels, use of fire-resistant roofing and defensible space in high wildfire threat and wildfire-urban-interface areas, structural retrofitting techniques for older homes, and use of intelligent grading practices through workshops, publications, and media announcements and events.
- 4) Develop a public education campaign on the cost, risk, and benefits of earthquake, flood, and other hazard insurance.
- 5) Use disaster anniversaries, such as April (Earthquake Month and the 1906 earthquake), September (9/11), and October (Loma Prieta earthquake and Oakland Hills fire), to remind the public on safety and security mitigation activities.
- 6) Sponsor the formation and training of Community Emergency Response Teams (CERT) training. [Note – these programs go by a variety of names in various cities and areas.]
- 7) Include flood fighting technique session based on California Department of Water Resources training to the list of available public training classes offered by CERT.
- 8) Institute the neighborhood watch block captain and team programs outlined in the Citizen Corps program guide.
- 9) Assist residents in the development of defensible space through the use of, for example, "tool libraries" for weed abatement tools, roadside collection and/or chipping services (for brush, weeds, and tree branches) in wildland-urban-interface fire-threatened communities or in areas exposed to high-to-extreme fire threat.
- 10) Train homeowners to locate and shut off gas valves if they smell or hear gas leaking.
- 11) Distribute NOAA weather radios to high-risk, limited-income families living in flood hazard areas.

- 12) Develop a program to provide at-cost NOAA weather radios to residents of flood hazard areas.
- 13) Make use of the materials on the ABAG web site at <http://quake.abag.ca.gov/fixit> and other web sites to increase residential mitigation activities related to earthquakes. (ABAG plans to continue to improve the quality of those materials over time.)
- 14) Develop a "Maintain-a-Drain" campaign, similar to that of the City of Oakland, encouraging businesses and residents to keep storm drains in their neighborhood free of debris.
- 15) Encourage the formation of a community- and neighborhood-based approach to wildfire education and action through local Fire Safe Councils and the *Fire Wise Program*.
- 16) Inform shoreline-property owners of the possible long-term economic threat posed by rising sea levels.

4. Economy (ECON)

Safe, disaster-resilient, and architecturally diverse downtown commercial areas, business and industrial complexes, and office buildings are essential to the overall economy of the region.

ECON-a. *Soft-Story*¹³ Commercial Buildings Vulnerable to Earthquakes

- 1) Require engineered plan sets for voluntary or mandatory soft-story retrofits until a standard plan set and construction details become available.
- 2) Adopt the 2003 International Existing Building Code, the 1997 UBC, or the latest applicable code standard for the design of voluntary or mandatory soft-story building retrofits.
- 3) Work to educate building owners, local government staff, engineers, and contractors on soft-story retrofit using materials such as those developed by ABAG (see <http://quake.abag.ca.gov/fixit>) and the City of San Jose.
- 4) Conduct an inventory of existing or suspected soft-story commercial and industrial structures.
- 5) Use the soft-story inventory to require owners to inform all existing tenants that they work in this type of building and the standard to which it may have been retrofitted, as well as require owners to inform tenants that they will work in this type of building prior to signing a lease.
- 6) Use the soft-story inventory to require owners to inform all existing tenants that they should be prepared to work elsewhere following an earthquake if the building has not been retrofitted.

¹³ A condition in which the building has far less stiffness in its lowest story than in upper stories, often due to multiple garage openings at the ground floor or large open windows for commercial space, increasing the likelihood of excessive sidesway or even collapse. Many of these buildings collapsed in the 1971 San Fernando, 1989 Loma Prieta, and 1994 Northridge earthquakes. An engineering definition is "a condition in which the stiffness of the seismic-force-resisting system in any story is less than 70 percent of the stiffness in the story above" (modified from the American Society of Civil Engineers (ASCE 31).

- 7) Investigate and adopt appropriate financial, procedural, and land use incentives for owners of soft-story buildings to facilitate retrofit.
- 8) Explore development of local ordinances or State regulations to require or encourage owners of soft-story structures to strengthen them.
- 9) Provide technical assistance in seismically strengthening soft-story structures.

ECON-b. *Unreinforced Masonry Buildings in Older Downtown Areas*

- 1) Continue to actively implement existing State law that requires cities and counties to maintain lists of the addresses of unreinforced masonry buildings and inform property owners that they own this type of hazardous structure.
- 2) Accelerate retrofitting of unreinforced masonry structures that have not been retrofitted through, for example, (a) actively working with owners to obtain structural analyses of their buildings, (b) helping owners obtain retrofit funding, (c) adopting a mandatory versus voluntary, retrofit program, and/or (d) applying penalties to owners who show inadequate efforts to upgrade these buildings.
- 3) Require owners to inform all existing tenants that they work in this type of building and the standard to which it may have been retrofitted, as well as require owners to inform tenants that they will work in this type of building prior to signing a lease.
- 4) Require owners to inform all existing tenants that they should be prepared to work elsewhere following an earthquake even if the building has been retrofitted, for it has probably been retrofitted to a life-safety standard, not to a standard that will allow occupancy following major earthquakes.
- 5) Create incentives for owners of historic or architecturally significant buildings to undertake mitigation to levels that will minimize the likelihood that these buildings will need to be demolished after a disaster, particularly if those alterations conform to the federal Secretary of the Interior's *Guidelines for Rehabilitation*.

ECON-c. *Other Privately-Owned Structurally Suspicious Buildings*

- 1) Inventory non-ductile concrete, tilt-up concrete, and other privately-owned structurally suspicious buildings.
- 2) Adopt the 2003 International Existing Building Code, the 1997 UBC, or the latest applicable code standard for the design of voluntary or mandatory retrofit of seismically vulnerable buildings.
- 3) Adopt one or more of the following strategies as incentives to encourage retrofitting of privately-owned structurally suspicious commercial and industrial buildings: (a) waivers or reductions of permit fees, (b) below-market loans, (c) local tax breaks, (d) grants to cover the cost of retrofitting or of a structural analysis, (e) land use and procedural incentives, or (f) technical assistance.
- 4) Create incentives for owners of historic or architecturally significant buildings to undertake mitigation to levels that will minimize the likelihood that these buildings will need to be demolished after a disaster, particularly if those alterations conform to the federal Secretary of the Interior's *Guidelines for Rehabilitation*.

ECON-d. *Wildfire and Structural Fires*

- 1) Increase efforts to reduce fire in existing development through improving engineering design and vegetation management for mitigation, appropriate code enforcement, and public education on mitigation strategies.
- 2) Require that new business and office buildings in high fire hazard areas be constructed of fire-resistant building materials and incorporate fire-resistant design features (such as minimal use of eaves, internal corners, and open first floors) to increase structural survivability and reduce ignitability.
- 3) Adopt and amend as needed updated versions of the *California Building and Fire Codes* so that optimal fire-protection standards are used in construction and renovation projects.
- 4) Create a mechanism to enforce provisions of the *California Building and Fire Codes* and other local codes that require the installation of smoke detectors and fire-extinguishing systems by making installation a condition of (a) finalizing a permit for any work on existing properties valued at over \$1000, and/or (b) on any building over 75 feet in height, and/or (b) as a condition for the transfer of property.
- 5) Expand existing vegetation management programs.
- 6) Establish a Fire Hazard Abatement District to fund reduction in fire risk of existing properties through vegetation management that includes reduction of fuel loads, use of defensible space, and fuel breaks.
- 7) Establish a Fire Hazard Abatement District to fund fire-safety inspections of private properties, roving firefighter patrols on high fire-hazard days, and public education efforts.
- 8) Compile a list of high-rise and high-occupancy buildings that are deemed, due to their age or construction materials, to be particularly susceptible to fire hazards, and determine an expeditious timeline for the fire-safety inspection of all such structures.
- 9) Conduct periodic fire-safety inspections of all commercial and institutional buildings.
- 10) Work with the State Fire Marshall, the California Seismic Safety, PEER, and other experts to identify and manage gas-related fire risks of soft-story mixed use buildings that are prone to collapse and occupant entrapment consistent with the natural gas safety recommendations of Seismic Safety Commission Report SSC-02-03.¹⁴
- 11) Ensure that fire-preventive vegetation-management techniques and practices for creek sides and high-slope areas do not contribute to the landslide and erosion hazard.
- 12) Work with insurance companies to create a public/private partnership to give a discount on fire insurance premiums to “Forester Certified” *Fire Wise* landscaping and fire-resistant building materials.

¹⁴ See http://www.seismic.ca.gov/pub/CSSC_2002-03_Natural%20Gas%20Safety.pdf. Note: any valves that are installed may need to have both excess flow and seismic triggers (“hybrid” valves).

ECON-e. *Flooding*

- 1) To reduce flood risk, thereby reducing the cost of flood insurance to property owners, work to qualify for the highest-feasible rating under the Community Rating System of the National Flood Insurance Program.
- 2) Balance the needs for commercial and industrial development against the risk from potential flood-related hazards.
- 3) Ensure that new development pays its fair share of improvements to the storm drainage system necessary to accommodate increased flows from the development, *or* does not increase runoff by draining water to pervious areas or detention facilities.
- 4) Provide sandbags and plastic sheeting to businesses in anticipation of rainstorms, and deliver those materials to the disabled and elderly upon request.
- 5) Provide public information on locations for obtaining sandbags and deliver those sandbags to those various locations throughout a city and/or county.
- 6) Apply floodplain management regulations for development in the floodplain and floodway.
- 7) Encourage business owners to participate in building elevation programs.
- 8) Encourage business owners to participate in acquisition and relocation programs for areas within floodways.
- 9) Require an annual inspection of approved flood-proofed buildings to ensure that (a) all flood-proofing components will operate properly under flood conditions and (b) all responsible personnel are aware of their duties and responsibilities as described in their building's *Flood Emergency Operation Plan* and *Inspection & Maintenance Plan*.

ECON-f. *Landslides and Erosion*

- 1) Increase efforts to reduce landslides and erosion in existing and future development by improving appropriate code enforcement and use of applicable standards, such as those appearing in the *California Building Code*, California Geological Survey *Special Report 117 – Guidelines for Evaluating and Mitigating Seismic Hazards in California*¹⁵, American Society of Civil Engineers (ASCE) report *Recommended Procedures for Implementation of DMG Special Publication 117: Guidelines for Analyzing and Mitigating Landslide Hazards in California*¹⁶, and the California Board for Geologists and Geophysicists *Guidelines for Engineering Geologic Reports*¹⁷. Such standards should cover excavation, fill placement, cut-fill transitions, slope stability, drainage and erosion control, slope setbacks, expansive soils, collapsible soils, environmental issues, geological and geotechnical investigations, grading plans and specifications, protection of adjacent properties, and review and permit issuance.
- 2) Increase efforts to reduce landslides and erosion in existing and future development through continuing education of design professionals on mitigation strategies.

¹⁵ See <http://gmw.consrv.ca.gov/shmp/SHMPsp117.asp>.

¹⁶ See <http://www.scec.org/resources/catalog/LandslideProceduresJune02.pdf>.

¹⁷ See <http://www.geology.ca.gov/publications/engineering.pdf>.

ECON-g. *Construction*

- 1) Continue to require that all new commercial and industrial buildings be constructed in compliance with structural requirements of the most recently adopted version of the *California Building Code*.
- 2) Conduct appropriate employee training and support continued education to ensure enforcement of construction standards.
- 3) Recognize that many strategies that increase earthquake resistance also decrease damage in an explosion. In addition, recognize that ventilation systems can be designed to contain airborne biological agents.

ECON-h. *Building Reoccupancy*

- 1) Institute an aggressive program similar to San Francisco's Building Occupancy Resumption Program (BORP). This program permits owners of private buildings to hire qualified structural engineers to create building-specific post-disaster inspection plans and allows these engineers to become automatically deputized as City/County inspectors for these buildings in the event of an earthquake or other disaster.
- 2) Allow owners to participate in a BORP-type program as described above, but not actively encourage them to do so.
- 3) Develop and enforce an ordinance for disaster-damaged structures to ensure that damaged buildings are repaired in an appropriate and timely manner.
- 4) Establish preservation-sensitive measures for the repair and reoccupancy of historically significant structures, including requirements for temporary shoring or stabilization where needed, arrangements for consulting with preservationists, and expedited permit procedures for suitable repair or rebuilding of historically of architecturally valuable structures.

ECON-i. *Public Education*

- 1) Provide information to business owners and employees on the availability of interactive hazard maps on ABAG's web site.
- 2) Develop printed materials, utilize existing materials (such as developed by FEMA and the American Red Cross), conduct workshops, and/or provide outreach encouraging businesses' employees to have family disaster plans that include drop-cover-hold earthquake drills, fire and storm evacuation procedures, and shelter-in-place emergency guidelines.
- 3) Develop printed materials, conduct workshops, and provide outreach to Bay Area businesses focusing on business continuity planning.
- 4) Better inform Bay Area business owners of mitigation activities, including elevation of appliances above expected flood levels, use of fire-resistant roofing and defensible space in wildland-urban- interface fire-threatened communities or in areas exposed to high-to-extreme fire threat, structural retrofitting techniques for older buildings, and use of intelligent grading practices through workshops, publications, and media announcements and events.
- 5) Sponsor the formation and training of Community Emergency Response Teams (CERT) training. [Note – these programs go by a variety of names in various cities and areas.]

- 6) Assist residents in the development of defensible space through the use of, for example, “tool libraries” for weed abatement tools, roadside collection and/or chipping services (for brush, weeds, and tree branches) in wildland-urban-interface fire-threatened communities or in areas exposed to high-to-extreme fire threat.
- 7) Make use of the materials developed by others (such as found on ABAG’s web site at <http://quake.abag.ca.gov/business>) to increase mitigation activities related to earthquakes. ABAG plans to continue to improve the quality of those materials over time.
- 8) Develop a “Maintain-a-Drain” campaign, similar to that of the City of Oakland, encouraging businesses and residents to keep storm drains in their neighborhood free of debris.
- 9) Encourage the formation of a community-based approach to wildfire education and action through local Fire Safe Councils and the *Fire Wise Program*.
- 10) Encourage businesses and laboratories handling hazardous materials or pathogens increase security to a level high enough to create a deterrent to crime and terrorism, including active implementation of “cradle-to-grave” tracking systems.
- 11) Encourage joint meetings of security and operations personnel at major employers to develop innovative ways for these personnel to work together to increase safety and security.
- 12) Inform shoreline-property owners of the possible long-term economic threat posed by rising sea levels.

5. Government Services (GOVT)

City and county governments, as well as community services agencies, provide essential services during and immediately following disasters, as well as critical functions during recovery, that need to be resistant to disasters.

GOVT-a. Focus on Critical Facilities

- 1) Assess the vulnerability of critical facilities (such as city halls, fire stations, and community service centers) to damage in natural disasters and make recommendations for appropriate mitigation.
- 2) Retrofit or replace critical facilities that are shown to be vulnerable to damage in natural disasters.
- 3) Conduct comprehensive programs to identify and mitigate problems with facility contents, architectural components, and equipment that will prevent critical buildings from being functional after major natural disasters.
- 4) Encourage joint meetings of security and operations personnel at critical facilities to develop innovative ways for these personnel to work together to increase safety and security.
- 5) Install micro and/or surveillance cameras around critical public assets tied to web-based software, and develop a surveillance protocol to monitor these cameras.
- 6) Identify and undertake cost-effective retrofit measures on critical facilities (such as moving and redesigning air intake vents and installing blast-resistant features) when these buildings undergo major renovations.

- 7) Coordinate with the State Division of Safety of Dams to ensure that cities and counties are aware of the timeline for the maintenance and inspection of dams whose failure would impact their jurisdiction.
- 8) As a secondary focus, assess the vulnerability of non-critical facilities to damage in natural disasters based on occupancy and structural type, make recommendations on priorities for structural improvements or occupancy reductions, and identify potential funding mechanisms.
- 9) Ensure that government-owned facilities are subject to the same regulations as imposed on privately-owned development.

GOVT-b. *Maintain and Enhance Local Government's Emergency Response and Recovery Capacity*

- 1) Establish a framework and process for pre-event planning for post-event recovery that specifies roles, priorities, and responsibilities of various departments within the local government organization, and that outlines a structure and process for policy-making involving elected officials and appointed advisory committees.
- 2) Prepare a basic Recovery Plan that outlines the major issues and tasks that are likely to be the key elements of community recovery, as well as integrate this planning into response planning.
- 3) Establish a goal for the resumption of local government services that may vary from function to function.
- 4) Develop a plan for short-term and intermediate-term sheltering of impacted residents.
- 5) Periodically assess the need for new or relocated fire or police stations and other emergency facilities, changes in staffing levels, and additional or updated supplies, equipment, technologies, and in-service training classes.
- 6) Ensure that fire and police department personnel have adequate radios, breathing apparatuses, protective gear, and other equipment to respond to a major disaster.
- 7) Develop and maintain a system of interoperable communications for first responders from cities, counties, special districts, state, and federal agencies.
- 8) Harden emergency response communications, including, for example, building redundant capacity into public safety alerting points, replacing or hardening microwave and simulcast systems, adding digital encryption for programmable radios, and ensuring a plug-and-play capability for amateur radio.
- 9) Purchase command vehicles for use as mobile command/EOC vehicles if current vehicles are unsuitable or inadequate.
- 10) Maintain the local government's emergency operations center in a fully functional state of readiness.
- 11) Expand traditional disaster exercises involving city and county emergency personnel to include airport and port personnel, infrastructure providers, hospitals, and major employers.
- 12) Maintain and update as necessary the local government's Standardized Emergency Management System Plan.
- 13) Continue to participate not only in general mutual-aid agreements, but also in agreements with adjoining jurisdictions for cooperative response to fires, floods, earthquakes, and other disasters.

- 14) Install an alert and warning system with outdoor sirens, coordinating them, to the extent possible, with those of neighboring jurisdictions.
- 15) Conduct periodic tests of the alerting and warning system's outdoor sirens no less frequently than once per month.
- 16) Regulate and enforce the location and design of street-address numbers on buildings and minimize the naming of short streets (that are actually driveways) to single homes.
- 17) Monitor weather during times of high fire risk using, for example, weather stations tied into police and fire dispatch centers.
- 18) Establish regional protocols on how to respond to the NOAA Monterey weather forecasts, such as the identifying types of closures, limits on work that could cause ignitions, and prepositioning of suppression forces). A multi-agency coordination of response also helps provide unified messages to the public about how they should respond to these periods of increased fire danger.
- 19) Increase local patrolling during periods of high fire weather.
- 20) Create and maintain an automated system of rain and flood gauges that is web enabled and publicly accessible.
- 21) Place remote sensors in strategic locations for early warning of hazmat releases or use of weapons of mass destruction.
- 22) Investigate the use of phone-based warning systems for selected geographic areas.
- 23) Review and update, as necessary, procedures pursuant to the *State Dam Safety Act* for the emergency evacuation of areas located below major water-storage facilities.
- 24) Develop procedures for the emergency evacuation of areas identified on tsunami evacuation maps as these maps become available.

GOVT-c. *Participate in National, State, Multi-Jurisdictional and Professional Society Efforts to Identify and Mitigate Hazards*

- 1) Promote information sharing among overlapping and neighboring local governments, including cities, counties, and special districts, as well as utilities.
- 2) Recognize that emergency services is more than the coordination of police and fire response, for it also includes planning activities with providers of water, food, energy, transportation, financial, information, and public health services.
- 3) Recognize that a multi-agency approach is needed to mitigate flooding by having flood control districts, cities, counties, and utilities meet at least annually to jointly discuss their a capital improvement programs for most effectively reducing the threat of storm-induced flooding.
- 4) As new flood-control projects are completed, request that FEMA revise its flood-insurance rate maps and digital geographic information system data to reflect flood risks as accurately as possible.
- 5) Participate in FEMA's National Flood Insurance Program.
- 6) Participate in multi-agency efforts to mitigate fire threat, such as the Hills Emergency Forum (in the east Bay), various *FireSafe* Council programs, and city-utility task forces.

- 7) Work with major employers and agencies that handle hazardous materials to coordinate mitigation efforts for the possible release of these materials due to a natural disaster such as an earthquake, flood, fire, or landslide.
- 8) Encourage staff to participate in efforts by professional organizations to mitigate earthquake and landslide disaster losses, such as the efforts of the Northern California Chapter of the Earthquake Engineering Research Institute, the East Bay-Peninsula Chapter of the International Code Council, the Structural Engineers Association of Northern California, and the American Society of Grading Officials.
- 9) Conduct and/or promote attendance at local or regional hazard conferences and workshops for elected officials to educate the officials on the critical need for programs in mitigating earthquake, wildfire, flood, and landslide hazards.

6. Education (EDUC)

Safe and disaster-resistant school and childcare-related facilities are critical to the safety of our children, as well as to the quality of life of our families.

EDUC-a. *Focus on Critical Facilities*

- 1) Assess the vulnerability of critical education facilities to damage in natural disasters and make recommendations for appropriate mitigation.
- 2) Retrofit or replace critical education facilities that are shown to be vulnerable to damage in natural disasters.
- 3) Conduct comprehensive programs to identify and mitigate problems with facility contents, architectural components, and equipment that will prevent critical buildings from being functional after major disasters.
- 4) As a secondary focus, assess the vulnerability of non-critical educational facilities to damage in natural disasters based on occupancy and structural type, make recommendations on priorities for structural improvements or occupancy reductions, and identify potential funding mechanisms.

EDUC-b. *Use of Schools as Emergency Shelters*

- 1) Encourage schools to work with the American Red Cross and others to set up memoranda of understanding for use of schools as emergency shelters following disasters.
- 2) Work with school districts to ensure that school personnel understand that being designated by the American Red Cross or others as a potential emergency shelter does not mean that the school has had a hazard or structural evaluation to ensure that it can be used as a shelter following any specific disaster.

EDUC-c. *Use of Schools as Conduits for Information to Families About Emergencies*

- 1) Support schools working with other local governments and agencies to utilize their unique ability to reach families through educational materials on hazards and preparedness, particularly after disasters and at the beginning of the school year. These efforts will not only make the entire community more disaster-resistant, but speed the return of schools from use as shelters to use as teaching facilities.

- 2) Support joint efforts of schools and fire jurisdictions to develop plans for evacuation or sheltering in place of school children during periods of high fire danger, thereby recognizing that overloading of streets near schools by parents attempting to pick up their children during these periods can restrict access by fire personnel and equipment.
- 3) Offer the 20-hour basic CERT training to middle school and/or high school students as a part of the basic science or civics curriculum, as an after school club, or as a way to earn public service hours.
- 4) Offer the 20-hour basic CERT training course through the Adult School system and/or through the Community College system.

7. Environment (ENVI)

Disaster resistance need to further environmental sustainability, reduce pollution, strengthen agriculture resiliency, and avoid hazardous material releases.

ENVI-a. *Environmental Sustainability and Pollution Reduction*

- 1) Continue to enforce State-mandated requirements, such as the *California Environmental Quality Act*, to ensure that mitigation activities for hazards, such as vegetation clearance programs for fire threat and seismic retrofits, are conducted in a way that reduces environmental degradation such as air quality impacts, noise during construction, and loss of sensitive habitats and species, while respecting the community value of historic preservation.
- 2) Encourage regulatory agencies to work collaboratively with safety professionals to develop creative mitigation strategies that effectively balance environmental and safety needs, particularly to meet critical wildfire, flood, and earthquake safety levels.
- 3) Continue to enforce State-mandated requirements, such as the *California Environmental Quality Act* and environmental regulations to ensure that urban development is conducted in a way to minimize air pollution. For example, air pollution levels can lead to global warming, and then to drought, increased vegetation susceptibility to disease (such as pine bark beetle infestations), and associated increased fire hazard.
- 4) Develop and implement a comprehensive program for watershed maintenance, optimizing forest health with water yield to balance water supply, flooding, fire, and erosion concerns.
- 5) Balance the need for the smooth flow of storm waters versus the need to maintain wildlife habitat by developing and implementing a comprehensive Streambed Vegetation Management Plan that ensures the efficacy of flood control efforts and maintains the viability of living rivers.
- 6) Stay informed of emerging scientific information on the subject of rising sea levels, especially on additional actions that local governments can take to mitigate this hazard.
- 7) Monitor the science associated with global warming to be able to act promptly when data become available to warrant special design and engineering of

government-owned facilities located in low-lying areas, such as wastewater treatment plants, ports, and airports.

- 8) Comply with applicable performance standards of any *National Pollutant Discharge Elimination System* municipal stormwater permit that seeks to manage increases in stormwater run-off flows from new development and redevelopment construction projects.
- 9) Enforce the grading, erosion, and sedimentation requirements by prohibiting the discharge of concentrated stormwater flows by other than approved methods that seek to minimize associated pollution.
- 10) Explore ways to require that hazardous materials stored in the flood zone be elevated or otherwise protected from flood waters.

ENVI-b. *Agricultural and Aquaculture Resilience*

- 1) Maintain a variety of crops in rural areas of the region to increase agricultural diversity and crop resiliency.
- 2) Promote and maintain the public-private partnerships dedicated to preventing the introduction of agricultural pests into regionally-significant crops, such as the glassy-winged sharpshooter into vineyards.
- 3) Septic tanks and other sources of contamination adjacent to economically-significant aquacultural and agricultural resources should be a priority for removal.
- 4) Encourage livestock operators to develop an early-warning system to detect animals with communicable diseases (due to natural causes or bioterrorism).

8. Land Use (LAND)

Land use change need to be accompanied by a respect for hazardous areas and facilities, as well as recognize the interconnected nature of our region.

LAND-a. *Earthquake Hazard Studies for New Developments*

- 1) Enforce the State-mandated requirement that site-specific geologic reports be prepared for development proposals within Alquist-Priolo Earthquake Fault Zones, and restrict the placement of structures for human occupancy. (This Act is intended to deal with the *specific* hazard of active faults that extend to the earth's surface, creating a surface rupture hazard.)
- 2) Require preparation of site-specific geologic or geotechnical reports for development and redevelopment proposals in areas subject to earthquake-induced landslides or liquefaction as mandated by the State Seismic Hazard Mapping Act in selected portions of the Bay Area where these maps have been completed, and condition project approval on the incorporation of necessary mitigation measures.
- 3) Recognizing that some faults may be a hazard for surface rupture, even though they do not meet the strict criteria imposed by the Alquist-Priolo Earthquake Fault Zoning Act, identify and require geologic reports in additional fault hazard areas.
- 4) Recognizing that the California Geological Survey has not completed earthquake-induced landslide and liquefaction mapping for much of the Bay Area, identify and require geologic reports in additional seismic hazard areas.

- 5) Support and/or facilitate efforts by the California Geological Survey to complete the earthquake-induced landslide and liquefaction mapping for the Bay Area.
- 6) Require that local government reviews of geologic and engineering studies are conducted by appropriately trained and credentialed personnel.

LAND-b. *Wildfire and Structural Fires*

- 1) Review development proposals to ensure that they incorporate required and appropriate fire-mitigation measures, including adequate provisions for occupant evacuation and access by emergency response personnel and equipment.
- 2) Develop a clear legislative and regulatory framework at both the state and local levels to manage the wildland-urban-interface consistent with *Fire Wise* and sustainable community principles.

LAND-c. *Flooding*

- 1) Establish and enforce requirements for new development so that site-specific designs and source-control techniques are used to manage peak stormwater runoff flows and impacts from increased runoff volumes.
- 2) Incorporate FEMA guidelines and suggested activities into local government plans and procedures for managing flood hazards.
- 3) Provide an institutional mechanism to ensure that development proposals adjacent to floodways and in floodplains are referred to flood control districts and wastewater agencies for review and comment (consistent with the NPDES program).
- 4) Establish and enforce regulations concerning new construction (and major improvements to existing structures) within flood zones in order to be in compliance with federal requirements and, thus, be a participant in the Community Rating System of the *National Flood Insurance Program*.

LAND-d. *Landslides and Erosion*

- 1) Establish and enforce provisions (under subdivision ordinances or other means) that geotechnical and soil-hazard investigations be conducted and filed to prevent grading from creating unstable slopes, and that any necessary corrective actions be taken prior to development approval.
- 2) Require that local government reviews of these investigations are conducted by appropriately trained and credentialed personnel.
- 3) Establish and enforce grading, erosion, and sedimentation ordinances by requiring, under certain conditions, grading permits and plans to control erosion and sedimentation prior to development approval.
- 4) Establish and enforce provisions under the creek protection, storm water management, and discharge control ordinances designed to control erosion and sedimentation.
- 5) Establish requirements in zoning ordinances to address hillside development constraints, especially in areas of existing landslides.

LAND-e. *Hillside – Multi-Hazard*

- 1) Establish a buffer zone between residential properties and landslide or wildfire hazard areas.

- 2) Discourage, add additional mitigation strategies, or prevent construction on slopes greater than a set percentage, such as 15%, due to landslide or wildfire hazard concerns.

LAND-f. *Smart Growth to Revitalize Urban Areas and Promote Sustainability*

- 1) Prioritize retrofit of infrastructure that serves urban areas over constructing new infrastructure to serve outlying areas.
- 2) Work to retrofit homes in older areas to provide safe housing close to job centers.
- 3) Work to retrofit older downtown areas to protect architectural diversity and promote disaster-resistance.
- 4) Protect as open space areas susceptible to extreme hazards.
- 5) Provide new buffers and preserve existing buffers between development and existing users of large amounts of hazardous materials, such as major industry, due to the potential for catastrophic releases due to an earthquake or terrorism. (Flooding might also result in release or spread of these materials, however it is unlikely.)

APPENDIX A

DRAFT Status of the Planning Process

Introduction

Development of this multi-jurisdictional plan addressing the diverse concerns and challenges of a region of seven million people has required a planning process that employs a variety of forums and techniques. In addition, many of the local governments involved in the development of this plan have plans and policies that predate this plan. Our goal in this effort has been to identify those pre-existing efforts, to build on them, and to identify gaps in mitigation efforts that have led to disaster vulnerabilities in order to work on ways to address these risks.

Workshops with Local Government Staff to Identify Concerns and Needs

From June 1 through August 5, 2004, ABAG staff held a series of nine 3-hour forums, one in each of the nine counties in the San Francisco Bay Area. Emails were sent to city and county managers, planning directors, public works directors, building officials, fire chiefs, and emergency managers of cities and counties inviting them to attend. Separate invitations were emailed and faxed to all of the city and county elected officials on ABAG standing committees and the ABAG Executive Board. County emergency managers forwarded the information to their contacts in special districts. ABAG worked with staff of the Metropolitan Transportation Commission (MTC) so that transit districts would be notified. A total of 260 staff (and two elected officials) from counties, cities, and special districts attended these workshops.

At these meetings, ABAG staff discussed the scope of work in developing this plan, demonstrated proposed Internet-based hazard mapping capabilities, discussed the types of risk assessments to be performed, and talked about the general format of the plan. An hour of the workshop was spent answering questions and questioning the attendees about their needs and concerns. Each person was individually queried regarding their views on the process, their concerns, and what they viewed as the most important outcomes of this process.

The immediate result of these workshops and follow-up email was the “finalization” of the draft list of 53 hazard maps to be put into ABAG’s on-line geographic information system (GIS). In addition, the use of landscape (versus portrait) layout format for the mapping was selected due to the desire of staff to allow more room for explanatory materials on the maps. Finally, ABAG reviewed the technical reports and studies that are being used as a basis for the risk assessment portion of the plan to ensure that it is comprehensive and technically accurate.

Mitigation Policy Outline and Review

Having reviewed the discussions at eight of the nine county forums, as well as the draft plans of Berkeley, Napa, and the State of California, ABAG staff developed a draft overall goal and eight basic commitments for the plan. These general policies were presented for comment at the July

15, 2004 meeting of ABAG's Executive Board. This Board is the principal policy Board for ABAG. It meets once every two months and is composed of County Supervisors and City Council members representing all of the counties in the Bay Area and the cities in those counties. The meetings of this Board are open to the public. While there was considerable discussion on the need to address hazard issues, no substantive changes in the goal or commitments were made.

Next, the goal and policies were presented to ABAG's Regional Planning Committee (RPC) at the September 1, 2004 meeting. RPC is the planning policy committee for ABAG. It meets once every two months and is composed of County Supervisors and City Council members representing all of the counties in the Bay Area and the cities in those counties, as well as environmental, economic, and equity groups.. The meeting was also open to the public. The group discussed the general commitments, recommended a change in the way the commitments were ordered (to their current order), and supported the commitments in concept (prior to full public discussion and review).

Use of Two ABAG Special-Issue Review Committees

Two committees are being used to develop policies that address housing safety, business risk, and lifeline issues.

The ABAG Earthquake and Hazards Outreach Committee has been tasked to help with development and review of the "template" mitigation strategies related to housing and business. The committee is chaired by an elected official and has members consisting of city staffs, contractors, California Geological Survey and U.S. Geological Survey scientists, and structural engineers (including both private-sector engineers and an engineer from the State Seismic Safety Commission staff).

At the meetings of this Outreach Committee on June 30, 2004 and September 15, 2004, continued integration with the International Code Council (ICC) Joint East Bay-Peninsula Chapter effort to develop housing retrofit standards was discussed, and supported. ABAG's proposed new effort to coordinate with the American Association of Grading Officials on landslide mitigation was also presented and discussed. Concerns for soft-story apartments were discussed and a full-day workshop for will be scheduled. ABAG has been working with, and was encouraged to continue to work with, Lakeshore Ave. businesses in Oakland in an effort to identify ways to improve the resiliency of downtown retail businesses.

The second committee, the ABAG Hazards Transportation and Lifelines Review Committee, is also chaired by an elected official and has members from city and county staffs, local transit districts, the California Highway Patrol (CHP), Caltrans, local water districts, PG&E, SBC Communications, the American Red Cross-Bay Area, the U.S. Geological Survey, and the Coastal Region office of the California Office of Emergency Services. This group met on July 26, 2004 to discuss the development of this plan and brainstorm potential mitigation strategies, particularly those related to transportation, water supply, sewage, power, and communications systems. The ways these issues interrelate to health, education, and the environment were also

discussed. Additional comments were obtained from this committee at its meeting of September 16, 2004.

Interaction with Professional Groups

Beginning in late July, ABAG staff have actively approached the Earthquake Engineering Research Institute Northern California Chapter (EERI-NC) Government Committee (July 26, 2004), the ICC East Bay/Peninsula Chapter (July 21, 2004), the Existing Buildings Committee of the Structural Engineers Association of Northern California (July 29, 2004), the American Society of Grading Officials (July 21, 2004), and the FireSafe Councils (August 25, 2004) regarding feedback and assistance in drafting mitigation strategies that could be incorporated into the general outline of the eight key commitments of this multi-jurisdictional plan.

Creation of Draft Strategies

ABAG staff drafted an outline of mitigation strategies and is re-circulating the policies to all participating local government agencies and various professional organizations. The strategies were created based on comments and discussions of the groups listed above, as well as from a review of the State hazard Mitigation Plan and draft Local Hazard Mitigation Plans of Berkeley, Napa (City), Napa County, and Oakland.

Initial General Public Outreach

The revised draft planning document was being distributed at the ABAG General Assembly conference on “Taming Natural Disasters” on October 6, 2004. This conference was widely advertised with printed and email fliers sent to 60,000 people representing local governments, business, social services, engineering, and environmental groups. Comments on additional strategies were solicited at the conference. Conference attendees were encouraged to submit comments.

ABAG used the October 6th conference to encourage the media to help publicize the plan and posted a request for comments on our web site to collect comments from the public. We also allowed the public to mail in suggestions.

Based on the comments received, the DRAFT plan was revised. It is being forwarded to FEMA Region IX and the California Office of Emergency Services on October 27, 2004. Comments received from these organizations will be incorporated into this document and the Final Draft Plan provided to cities, counties, and special districts for adoption.

APPENDIX B

DRAFT Review of the Plan Update Process

Background

ABAG applied for funding to prepare this plan to FEMA through the California Governor's Office of Emergency Services (OES) at the end of August 2003. ABAG received notice that the 24-month project had been approved in mid-April 2004 and the award notice in writing in early May 2004. Meanwhile, the plans are officially due on November 1, 2004. FEMA and OES have requested a 45-day review period. This means that the Bay Area plan should be completed by September 1, 2004 at the latest to allow for review and making any changes. Obviously, it is impossible to shrink the envisioned 24-month planning process into four months.

Preparation Schedule for the "Interim" and "Comprehensive" Plan

ABAG is working with cities, counties, and special districts to form a schedule for plan development that is both reasonable and will ensure a quality product. First, it appears that there are no major effects of delaying the adoption of the plan until, at a minimum, early 2005 since the plan needs to be completed prior to a local government *receiving* FEMA mitigation funds, rather than prior to that local government *applying for* those funds. This conclusion is consistent with the 9-month lag between ABAG applying for the FEMA PDM-C funds that are funding the production of this multi-jurisdictional plan and its receipt of those funds.

Our goal is to have an "interim" plan developed, adopted by many local governments, and approved by OES and FEMA by early 2005. This "interim" plan will meet all of the minimum requirements of a Local Hazard Mitigation Plan. However, it will be missing several plan pieces that are in the regulations defining the plan contents with the language that the plan "should" contain versus the plan "shall" contain these items. These pieces are typically related to loss estimation and the clear tie between risk and mitigation impacts.

Our goal is to have a "comprehensive" plan by early 2006 near the end of the 24-month grant. *This complete plan will include much more extensive loss estimation data, clear ties between risk assessment data and mitigation strategies, and additional information on the mitigation strategies, including criteria for measuring progress toward the goal of disaster resistance.*

Future Updates of This Plan

ABAG will continue to update this plan over time. The plan will be updated at least every five years, as required by DMA 2000. However, it will be updated more frequently as time and money allow. When an update occurs, participating local governments will be notified of the updates and, if changes are significant (that is, involve more than minor changes to, for example, the hazard mapping), will be asked to submit another resolution approving the plan.

For example, ABAG will continue to update its geographic information system based on new information from state and federal agencies, as well as from research projects conducted by ABAG and others. In addition, public participation will be encouraged at specific issue-oriented workshops over the next few months as time and funding allow.